CRUISE REPORT

Southeast Fishery-Independent Survey (SEFIS)

NOAA Ship *Nancy Foster* Cruise NF-10-15-Leg 3
13 – 22 October 2010
Total Number of Days At-Sea - 10

U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Southeast Fisheries Science Center
Beaufort Laboratory
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79 camera-trap deployments
27 CTD casts
7 areas mapped

INTRODUCTION

The NOAA Ship *Nancy Foster* departed Charleston, SC, on 13 October 2010 at 1400 as part of the Southeast Fishery-Independent Survey (SEFIS) that samples in continental shelf and shelf-break waters off the southeastern US. SEFIS was created by the National Marine Fisheries Service in 2010 and operates out of the Beaufort Laboratory. This survey was created to conduct applied fishery-independent sampling and related research focusing on the assessment of spatial variability in distribution and abundance of red snapper and other reef species within the snapper-grouper complex, via data collected from fish traps, video cameras, and acoustics. During this survey, chevron trap catches and associated underwater video recordings were collected from known hardbottom habitats between 28.29 °N and 29.98 °N. A total of 79 stations were sampled with camera-trap gear over 10 sea days between 21 and 61 m depths.

OBJECTIVES

1. Increase the spatial footprint and sample size of fishery-independent sampling in US southeast waters. Baited chevron traps, with one or more mounted high-definition video cameras, were utilized for (a) hardbottom reef fish community assessments, (b) collection of reef fish for biological samples (i.e., otoliths and gonads), and (c) comparative gear sampling (cameras versus traps versus split-beam sonar).

2. Use video cameras on chevron traps to address trap selectivity issues, locate and describe hardbottom habitats, and provide an additional index of abundance for stock assessments.

3. Use a CTD instrument package to collect environmental data (temperature, salinity, dissolved oxygen) at camera-trap sampling locations.

4. Map bottom habitats using multibeam sonar to improve survey design and to expand knowledge of hardbottom habitats in the southeast US.

5. Use fisheries acoustic gear (split-beam sonar) to assess its use as a fishery-independent survey tool.

METHODS

Camera-Trap Sampling

Camera-trap gear consisted of one or two high definition video cameras mounted to a chevron fish trap. Chevron traps were composed of plastic-coated wire mesh. Different configurations of cameras were used on the traps. Generally, two GoPro cameras (model HD Hero®) were attached to the trap – one above the nose of the trap and one above the mouth (Figure 1). We also tested new Canon cameras (model HS F200), but they were used sparingly since we encountered problems with camera focus. Traps were baited with Atlantic menhaden, *Brevoortia tyrannus*, and video cameras were set to record before deployment. Camera-traps were deployed at least 200 meters apart on suspected or known hardbottom habitats, and left to soak for approximately 90 minutes. Camera-traps were most often deployed in sets of six. A CTD cast (see environmental data collection) was conducted during the 90-minute soak time for each trap set. Fish catches were processed after trap retrieval. All fish were enumerated, weighed, and measured to the nearest millimeter. Individuals of select species (e.g., species found in the snapper-grouper complex) were further processed for additional lengths and biological samples (otoliths, gonads, and DNA). Video files were downloaded and backed up on media storage devices. Biological samples and video files were brought to the Beaufort laboratory for further processing and analysis.

Environmental Data Collection
Environmental data were collected with a Seabird "Conductivity, Temperature, and Depth" instrument package (CTD; model SBE 9) and Scientific Computer System (SCS) software. CTD casts were conducted near the middle of each camera-trap soak period; instruments were lowered to within 2 meters of the bottom. Numerous water profile measurements were collected, including temperature (◦C), salinity (parts per thousand), and dissolved oxygen (mg/L). CTD data were archived for further processing at the Beaufort laboratory. SCS software (version 4.2) was used to collected specific information for each fishing and CTD event, including soak time/cast duration as well as start and end latitude, longitude and depth (m).

Acoustic Data Collection
Multibeam acoustic data collection: The *Nancy Foster* multibeam unit (Kongsberg-Simrad EM 1002) was typically used to map benthic habitats during nighttime hours. Areas for mapping were selected based on the need for additional hardbottom sampling sites in an area, information from fishermen, and efficient use of vessel time. Raw multibeam data were processed by the ship's survey technicians each morning, and these hardbottom habitat maps were used to select areas for sampling during the day.

Split-beam acoustic data collection: Two EK60 echosounders (38 and 120 KHz) were used to collect water column information, as well as document bottom features indicative of hardbottom habitat. Interesting bottom features were logged using ER60 acquisition software, and GPS coordinates were extracted by mousing over specific features of the ocean bottom in georeferenced graphic displays or by processing EK60 files (*.raw) within Echoview software (v4.90).

SURVEY RESULTS

Camera-Trap Sampling
79 stations were sampled with camera-trap gear (Table 1, Figure 2). From these traps, 26 taxa were collected and worked up for length frequency data.

Environmental Data Collection
27 CTD casts were conducted during the cruise (Table 1, Figure 2). CTD data were processed with Seabird SBE Data Processing software (version 7.2), and archived in a database at the NMFS-Beaufort Laboratory for future analysis.

Acoustic Data Collection
Multibeam:
7 areas were mapped using multibeam acoustic gear (Figure 3). Multibeam data were processed with Caris software on board the Nancy Foster. Multibeam maps were useful in selecting camera-trap sampling sites, i.e., identifying hardbottom habitats. All multibeam acoustic data were archived on a server and compiled in an Arc GIS project at the NMFS-Beaufort Laboratory for future analysis and survey planning.

Split-beam:
The EK60 echosounders recorded water column information during all multibeam mapping efforts. GPS points extracted from EK60 data were often used in conjunction with the Simrad multibeam to determine probable trap/video sampling sites for the following day. All EK60 acoustic data were archived on a server at the NMFS, Beaufort Laboratory for future analysis.

Table 1. Summary of station coordinates, depth, date and time for each fishing event (camera-trap, Gear=324) and CTD cast (Gear=298) conducted on the NF-10-15-Leg 3 survey. Times were recorded in Coordinated Universal Time (UTC).

Collection Number	Gear	Date	Time (UTC)	Latitude	Longitude	Depth (m)
101194	298	10/14/2010	22:45:00	28.29	-80.02	72
101195	298	10/15/2010	04:59:00	28.31	-80.06	62
101196	324	10/15/2010	12:28:00	28.50	-80.11	51
101197	324	10/15/2010	12:43:00	28.50	-80.11	53
101198	324	10/15/2010	12:56:00	28.51	-80.11	52
101199	324	10/15/2010	13:14:00	28.51	-80.11	52
101200	324	10/15/2010	13:18:00	28.51	-80.11	53
101201	298	10/15/2010	13:36:00	28.51	-80.12	50
101202	324	10/15/2010	17:05:00	28.52	-80.12	51
101203	324	10/15/2010	17:16:00	28.52	-80.11	52
101204	324	10/15/2010	17:19:00	28.52	-80.12	48
101205	324	10/15/2010	17:28:00	28.52	-80.12	51
101206	324	10/15/2010	17:38:00	28.53	-80.12	49
101207	324	10/15/2010	17:47:00	28.53	-80.12	51
101208	324	10/15/2010	20:27:00	28.51	-80.11	52
101209	324	10/15/2010	20:30:00	28.51	-80.11	49
101210	298	10/15/2010	20:56:00	28.51	-80.11	55
101211	298	10/16/2010	00:08:00	28.71	-80.11	64
101212	298	10/16/2010	06:25:00	28.74	-80.16	49
101213	324	10/16/2010	12:04:00	28.73	-80.15	52
101214	324	10/16/2010	12:13:00	28.73	-80.14	54
101215	324	10/16/2010	12:21:00	28.73	-80.14	51
101216	324	10/16/2010	12:30:00	28.73	-80.14	58
101217	324	10/16/2010	12:38:00	28.72	-80.14	49
101218	324	10/16/2010	12:43:00	28.72	-80.14	61
101219	298	10/16/2010	12:53:00	28.72	-80.14	55
101220	324	10/16/2010	16:27:00	28.72	-80.14	48
101221	324	10/16/2010	16:41:00	28.72	-80.14	49
101222	324	10/16/2010	16:54:00	28.72	-80.14	57
101223	324	10/16/2010	17:01:00	28.71	-80.14	49
101224	324	10/16/2010	17:10:00	28.71	-80.14	55
101225	324	10/16/2010	17:17:00	28.71	-80.14	51
101226	298	10/16/2010	17:45:00	28.72	-80.15	51
101227	298	10/16/2010	23:49:00	29.16	-80.56	25
101228	298	10/17/2010	05:43:00	29.18	-80.62	22
101229	324	10/17/2010	12:09:00	29.16	-80.54	22
101230	324	10/17/2010	12:18:00	29.16	-80.54	23
101231	324	10/17/2010	12:27:00	29.16	-80.54	22

Collection Number	Gear	Date	Time (UTC)	Latitude	Longitude	Depth (m)
101232	324	10/17/2010	12:36:00	29.16	-80.55	24
101233	324	10/17/2010	12:44:00	29.16	-80.55	21
101234	298	10/17/2010	12:59:00	29.16	-80.54	25
101235	324	10/17/2010	16:02:00	29.17	-80.56	22
101236	324	10/17/2010	16:11:00	29.17	-80.56	25
101237	324	10/17/2010	16:20:00	29.17	-80.56	23
101238	324	10/17/2010	16:35:00	29.17	-80.57	26
101239	324	10/17/2010	16:43:00	29.17	-80.57	23
101240	298	10/17/2010	17:08:00	29.16	-80.56	25
101241	298	10/17/2010	21:37:00	29.30	-80.38	30
101242	298	10/18/2010	00:35:00	29.34	-80.59	27
101243	298	10/18/2010	06:49:00	29.39	-80.60	28
101244	324	10/18/2010	12:00:00	29.30	-80.39	27
101245	324	10/18/2010	12:09:00	29.30	-80.39	30
101246	324	10/18/2010	12:16:00	29.31	-80.39	27
101247	324	10/18/2010	12:25:00	29.31	-80.39	30
101248	324	10/18/2010	12:32:00	29.31	-80.39	28
101250	298	10/18/2010	14:50:00	29.31	-80.40	27
101251	324	10/18/2010	19:39:00	29.70	-80.46	30
101252	324	10/18/2010	19:49:00	29.70	-80.46	32
101253	324	10/18/2010	20:10:00	29.70	-80.48	30
101254	324	10/18/2010	20:21:00	29.70	-80.48	31
101255	298	10/18/2010	22:40:00	29.70	-80.47	32
101256	298	10/19/2010	05:00:00	29.77	-80.46	34
101257	324	10/19/2010	12:14:00	29.77	-80.46	32
101258	324	10/19/2010	12:21:00	29.77	-80.46	31
101259	324	10/19/2010	12:23:00	29.77	-80.45	33
101260	324	10/19/2010	12:31:00	29.77	-80.46	33
101261	324	10/19/2010	12:39:00	29.76	-80.45	32
101262	298	10/19/2010	12:51:00	29.77	-80.45	36
101263	324	10/19/2010	15:40:00	29.76	-80.45	32
101264	324	10/19/2010	15:50:00	29.76	-80.45	31
101265	324	10/19/2010	15:57:00	29.76	-80.45	31
101266	324	10/19/2010	16:04:00	29.75	-80.45	30
101267	324	10/19/2010	16:11:00	29.75	-80.45	31
101268	324	10/19/2010	18:36:00	29.77	-80.43	39
101269	324	10/19/2010	18:44:00	29.78	-80.43	37
101270	324	10/19/2010	18:51:00	29.78	-80.43	40
101271	324	10/19/2010	18:56:00	29.78	-80.43	38
101272	324	10/19/2010	19:09:00	29.77	-80.44	36
101273	298	10/19/2010	19:30:00	29.78	-80.44	36
101274	298	10/19/2010	22:00:00	29.76	-80.46	35

Collection Number	Gear	Date	Time (UTC)	Latitude	Longitude	Depth (m)
101275	298	10/20/2010	04:55:00	29.70	-80.44	34
101276	324	10/20/2010	12:17:00	29.74	-80.47	31
101277	324	10/20/2010	12:24:00	29.74	-80.47	34
101278	324	10/20/2010	12:35:00	29.74	-80.47	32
101279	324	10/20/2010	12:42:00	29.73	-80.47	33
101280	324	10/20/2010	12:52:00	29.73	-80.47	33
101281	298	10/20/2010	13:13:00	29.74	-80.47	35
101282	324	10/20/2010	15:55:00	29.74	-80.46	32
101283	324	10/20/2010	16:05:00	29.73	-80.46	31
101284	324	10/20/2010	16:10:00	29.73	-80.46	33
101285	324	10/20/2010	16:17:00	29.73	-80.46	30
101286	324	10/20/2010	16:26:00	29.73	-80.46	33
101287	324	10/20/2010	19:27:00	29.74	-80.45	30
101288	324	10/20/2010	19:36:00	29.73	-80.45	31
101289	324	10/20/2010	19:43:00	29.73	-80.45	31
101290	324	10/20/2010	19:51:00	29.73	-80.45	32
101291	324	10/20/2010	19:58:00	29.73	-80.45	32
101292	298	10/20/2010	20:10:00	29.73	-80.44	32
101293	298	10/20/2010	23:57:00	29.85	-80.27	64
101294	298	10/21/2010	06:07:00	29.84	-80.29	51
101295	324	10/21/2010	11:46:00	29.98	-80.28	53
101296	324	10/21/2010	11:52:00	29.98	-80.28	58
101297	324	10/21/2010	12:00:00	29.97	-80.28	53
101298	324	10/21/2010	12:05:00	29.97	-80.29	49
101299	324	10/21/2010	12:13:00	29.97	-80.29	50
101300	298	10/21/2010	12:39:00	29.98	-80.28	62

Figure 1. Chevron trap with video cameras attached over the nose and mouth positions.

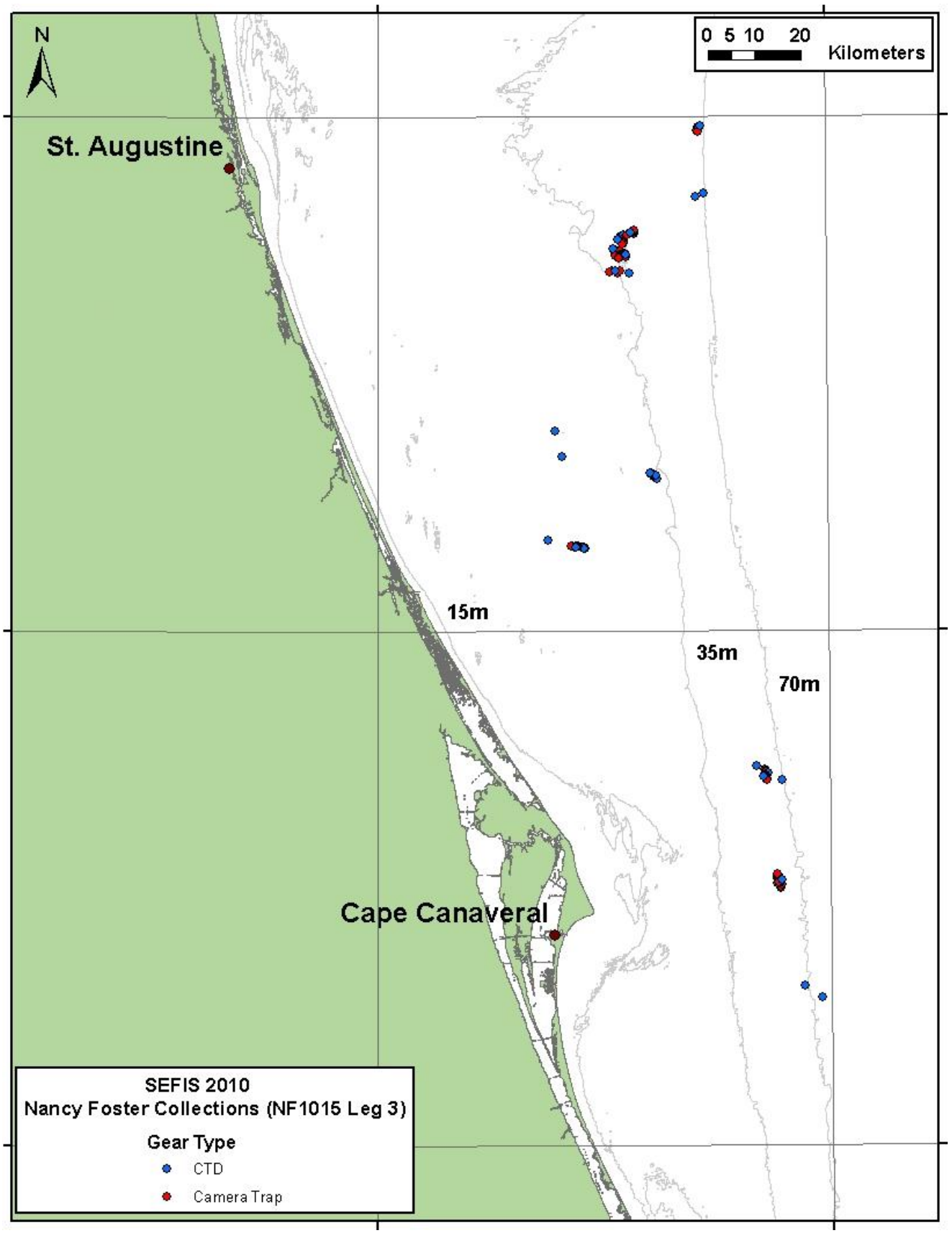

Figure 2. Locations of stations sampled with camera-trap and CTD gear on the NF-10-15-Leg 3 survey. Note that symbols overlap in many cases.

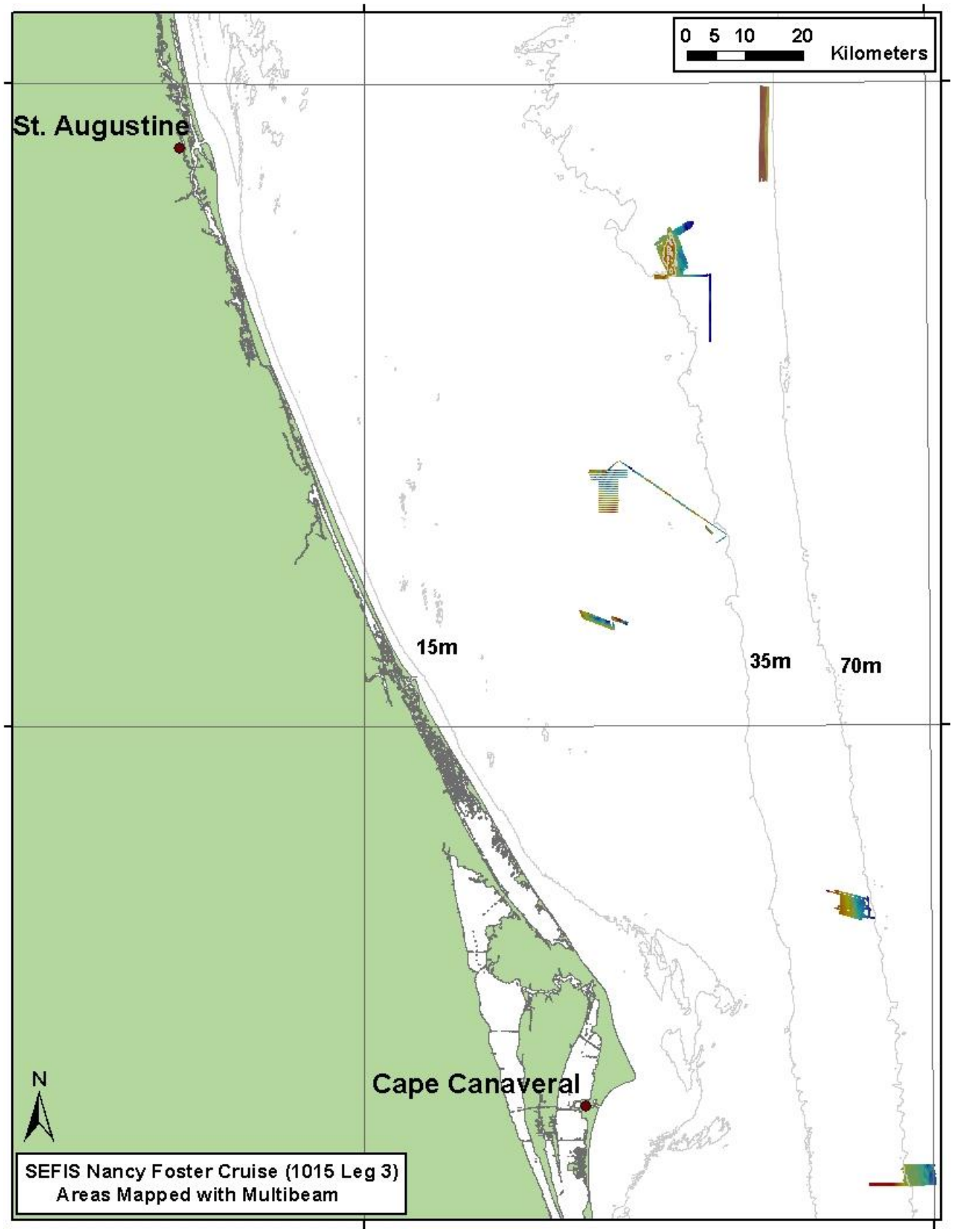

Figure 3. Locations mapped with multibeam acoustic gear on the NF-10-15-Leg 3 survey.

Leg 3 (13 – 22 October 2010)

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